

Spizætus

grinnelli

(2 packets) #1

Identification material

The identification of the various elements of the skeleton of *gimmelli* has been based largely upon ^{the} degree of resemblance to *Geranoaetus* ~~*gimmelli*~~ *melanoleucus* and *Aquila* ~~*gimmelli*~~ *fragilis*, compared with the degree of resemblance of *G. fragilis* to the same species. The ~~only~~ two species with which confusion in size might arise (not in all, but in certain elements) are *Neogyps* *errans* & *G. fragilis*. *Neogyps* can be ~~differentiated~~ ^{differentiated} as described above in the discussion of that genus, as well as by the ~~absence~~ resemblance of its elements to the *Vulturidae* & *Haliaeetus*.

obscure

In separating ~~from~~ the elements of *gimmelli* from those of *G. fragilis*, those elements which correspond most closely with *Geranoaetus melanoleucus* and *Buteo*, and *Urebitinga*, & and thus agree with the taxonomic characters of *fragilis*, have been assigned to *fragilis*. Those which remain are ^{found in nearly all instances} ~~found in nearly all instances~~ either ^{characterized by} ~~characterized by~~ to resemble *Aquila* more closely than *Geranoaetus*, and these have been assigned to *Palaquila gimmelli*. ~~This has~~ differentiation is borne out also in the ~~more~~ fragile nature of the bones assigned to *fragilis*. For the most part those assigned to *gimmelli* are stouter, the

$$\begin{array}{r} 170.0 \\ 159.8 \\ \hline 10.2 \end{array}$$

$$\begin{array}{r} 154.0 \\ 149.1 \\ \hline 4.9 \end{array}$$

$$\begin{array}{r} 146.4 \\ 142.0 \\ \hline 4.4 \end{array}$$

$$\begin{array}{r} 178.8 \\ 171.9 \\ \hline 6.9 \end{array}$$

$$\begin{array}{r} 177.1 \\ 174.2 \\ \hline 2.9 \end{array}$$

The possibility that there are more than the one species represented in this material assigned to grimmelli has occurred to the writer. On the putnam humeri ~~series~~ placed with grimmelli a variation of 31.1 mm. is noted. The humeri ^{are} group themselves into four groups as follows: ① three ^{last} specimens of from 173.1 to 170.0 mm. followed by a break of 10.2 mm.; ② seven ranging from 159.8 to 154.0 mm. followed by a break of 4.9 mm.; ③ three ranging from 149.1 to 146.4 mm. followed by a break of 4.4 mm.; ④ one specimen 142.0 mm.

Study of the ^{variation} of other species - living & fossil reveals the following data: In 14 specimens of Neogypso the variation is only 14.8 mm.; in 43 of Nepleuronops americanus, 13.5 mm.; in 6 of modern Aquila chrysaetos, 22.1 mm. with a break of 10.7 mm. between two which are undoubtedly females and the other four, and another break of 6.9 mm. between a small indiv. from Oregon & one from Arizona; in 141 specimens of fossil Aquila chrysaetos from La Brea, 42.4 mm. variation and no breaks exceeding 3.0 mm.

The caupometacarpus ~~and scapula~~ has a somewhat similar variability tho with a smaller range - 24.4 mm. Of this element there are fifty specimens seven of which are divided from the remaining 43 by a break of 6.9 mm., and at the smaller extremity there are three breaks ~~each~~ of about 2 mm. each. The range in 63 specimens of Neogyro is 13.1 mm. in 113 of Nepluontops, 8.7 mm., in seven ^{modern} Agriola chrysaetos, approx. 11.5 mm. and in 650 fossil Agriola chrysaetos, 20.2 mm.

The scapula also shows five specimens larger than the rest, the Tibio-farsus one. The 101 specimens of Farsus, 50 coracoids, and 20 femora have no breaks between large specimens distinct from the others. In each of these, however, there is a distinction between the majority of the specimens and a small group.

$$\begin{array}{r} 164.9 \\ 150.2 \\ \hline 14.7 \end{array}$$

$$\begin{array}{r} 172.3 \\ 148.0 \\ \hline 24.3 \end{array}$$

$$\begin{array}{r} 1213 \\ 113.2 \\ \hline 8.1 \end{array}$$

$$\begin{array}{r} 135.6 \\ 114.1 \\ \hline 21.5 \end{array}$$

$$\begin{array}{r} 225 \overline{) 880} \\ \underline{680} \\ 200 \end{array}$$

In studying the elements assigned to *Spizaetus grinnelli*, it, at first seemed possible that there were three species of *Spizaetus* represented instead of one. In the humerus, ulna, carpometacarpus and scapula there is a variation in size of 31mm., 35mm., 24mm., and 17.4mm respectively with a decided gap between a small group of very large bones and the remainder of the specimens. In proportions and physical characters, however, it is impossible to distinguish the large elements from the major portion of the specimens. In the leg bones, and coracoid not only is the variation much less -- approximately 14mm. for the tarsometatarsus and tibio tarsus, 11mm. for the coracoid and 8.7mm. for the femur, but in all but the tibiotarsus, no gap ~~xxx~~ from the largest to the smallest specimens; in the tibiotarsus, there is a gap of 4.8 mm. between ~~the largest~~ a single large specimen and the remainder of the bones. *In the*

tibiotarsus the smallest specimens are larger than the 4 smallest specimens of humerus while the longest femur is shorter than the 3 largest specimens of humerus
 If the ~~range of~~ ^{size} variation in *Spizaetus* be compared with that noted (see table below) in the fossil *Aquila chrysaetos*, it will be seen that the occurrence of a large range in size is not surprising in a genus related to *Aquila*, and also that a smaller range may be expected in the tarsometatarsus than in the wing elements; the discrepancy in range in size of the other two leg bones as compared with *Aquila* may perhaps be accounted for as a matter of chance due to absence of critical specimens.

Considering the facts relating to the ~~large~~ specimens, ~~of~~ *Spizaetus* the writer does not feel that the evidence justifies the description of a distinct ^{large} species of *Spizaetus*. The reasons may be summarized as follows: 1) *Among the raptors* Even in closely related species the humerus may be expected to vary in some characters other than actual size -- this is not the case here; (2) The "gaps" in some elements and the small range in size in others could be accounted for by chance; having less than 30 specimens in all elements but the tarsus and less than 25 specimens in most cases, the element of chance should be carefully considered especially in a genus which shows undoubted relation to the decidedly variable *Aquila*.

The other possibility of a distinct species of Spizaetus was found in taking the relative measurements of the tarsometatarsus. A group of about sixteen tarsometatarsi among the smaller specimens of this element, were found to be relatively more slender and have a more proximally placed ~~but~~ercle for the ~~bit~~ialis anticus, than is true of the remaining 85 specimens. An attempt to discover a similar condition in the other elements of the skeleton resulted in finding a single humerus and femur and 2 tibiotarsi which seemed to agree in combining small size with exceptional slenderness throughout the bone. Each of these, however, overlaps the main group in one or two proportions. (see table)

Furthermore the tibiae appear to be two long in proportion to the humerus
A single small carpometacarpus and small coracoid are separated on the

basis of an actual size gap from the other specimens, but show no *However in the tarsus femur + tibia the* the separation of group as a distinct sp proportional difference. Though ~~this smaller~~ *slender elements* based upon pro-

portionate differences seems a more logical possibility than the large *are not the smallest group*

~~specimens~~ just discussed, based on actual size ^{above} *specimens but only among the smallest* only, the fact that the proportions overlap, has deterred the writer from describing this

species as distinct. ~~It might perhaps be set apart subspecifically~~ *as well as the apparent sexual tendency to variation in the*

Variations in length of elements of

chrysaetos Aquila and Spizaetus *gunnelli*

	Aquila	Spizaetus →	
Humerus	42.3mm.	31.1mm.	(14 specimens)
Ulna	32.2	35.1	(6 ")
Carpometacarpus	20.3	24.4	(28 ")
Femur	21.8	8.7	(18 ")
Tibiotarsus	24.8	14.5	(24 ")
Tarsometatarsus	16.9	14.2	(101 ")

Table showing possible separation of a group of small specimens
of Spizaetus grinnelli from the ~~the~~ main group

Humerus						
	Length	Length* Deltoid crest	Breadth* distal end	Breadth* prox. end	Length* bicipital crest	No. of speci- mens represented
Main group 13 specimens maximum	173.1mm.	38.8%	18.3%	20.2	19.8%	13
minimum	146.2	37.0	17.4	18.5	17.8	
Small specimen L.A.M. no. D2626	142.0	37.4	17.8	18.7	17.1	1
Carpometacarpus						
	Length	Greatest breadth and least breadth of carpal trochlear*				No. of specimens represented
Main group maximum	97.0mm.	27.8%		23.8%		27
minimum	74.3	24.8		21.6		
Small specimen L.A.M. no. E1938	72.6	26.1		22.7		1
Femur						
	Length	Breadth prox. end	Breadth across condyles	Depth internal condyle	Depth external condyle	N. of specimens represented
Main group maximum	121.3	22.8	17.6	16.9	18.5	17
minimum	112.6	21.0	16.1	15.3	17.4	
Small specimen L.A.M. no. C1362	113.2	21.4	15.5	15.3	16.8	1
Tibiotarsus						
	Length	Breadth prox. end	Depth prox. end	Breadth distal end		No. of specimens represented
Main group maximum	164.6	13.1	16.3	12.7		22
minimum	150.1	12.1	14.7	11.5		
L.A.M. nos. Small group C3445	152.4	11.4	14.8	11.0		2
C5893	150.9	11.7	14.3	11.0		

* Ratios, relative to length. Maximum and minimum ratios
given for each measurement.

Tarsometatarsus

	Length	Breadth* prox. end	Breadth* dist. end	Distance* to tubercle for tib. ant.	Depth of shaft	No. of specs. rep'd
Main group	114.8	19.4%	21.3%	23.9%	10.1%	85
minimum	101.1	17.1	19.2	21.2	8.4	
Small group						16
maximum	107.6	17.2	18.9	21.3	8.8	
minimum	100.6	15.8	18.3	19.5	7.6	

* Ratio, relative to length. maximum and minimum ratios given for each measurement

Element	Large		Medium		Small	
	max.	min.	max.	min.	max.	min.
Coracoid	63.8	62.1	61.9	54.4	52.3	52.3
Humerus	173.1	170.0	159.8	146.4	142.0	142.0
Carpus	99.0	90.9	84.1	74.4	74.6	72.6
Femur			121.3	113.7	113.2	113.2
Tibia	164.6	—	159.8	150.1	152.4	150.9
Tarsus			114.8	101.1	107.6	100.6
Femur } to hum.			76.1	77.6	19.3	79.8
Coracoid } to femur			50.9	47.9		
Coracoid } to carpus	65.2	62.7	73.4	73.3	72.1	
Coracoid } to tibia	38.4	37.4	38.7	39.7	8	34.6
Coracoid } to tarsus			54.1	53.4		52.1
Carpus } to tibia			73.3	13.4	69.3	72.2
Humerus } to tibia	95.1		107.0			113.2
Wing	270.1	260.9	243.9	220.8	214.6	214.6
Length leg			395.9	364.9	373.2	364.7
Wing leg			61.6	60.8	57.4	55.3
Tarsus			71.8	69.1	75.8	70.8
Humerus						

$$\begin{array}{r}
 214 \text{ @} \\
 1719 \times \\
 \hline
 441
 \end{array}$$

$$\begin{array}{r}
 173 \text{ @} \\
 142.0 \\
 \hline
 31.1
 \end{array}$$

$$\begin{array}{r}
 8469 \\
 9881 \\
 8881 \\
 \hline
 6951 \\
 8152 \quad 6951 \\
 \hline
 81
 \end{array}$$

	Large		Small	
	max,	min	max	min
Coracoid	63.3	62.1		

Tarsus

gimmelli with ~~the~~ ^{no} groove on proximal anterior face. ① internal to tubercle for tibialis anterior, no groove on ~~external~~ ^{external} side of tubercle, in this region sloping off from tubercle to internal margin without groove or with very faint groove in 2 specimens of fragilis. ^{Excavation} groove on external side to tubercle making tubercle more prominent than in gimmelli.

③ Internal side of shaft below half way slightly excavated in gimmelli, slightly convex in fragilis and woodwardi.

④ External side - line from external margin of prox end: ~~starts~~ ^{in frag & wood} ~~subcardinal~~ ^{evening} ~~inward to place on line with~~ in fragilis and woodwardi starts ~~inward~~ ^{inward} gradually to below tubers, then in decidedly ~~down~~ ^{down} on anterior side. Woodwardi about as in fragilis. Gimmelli starts all the way - with a tendency ~~however~~ ^{to give} ~~to give~~ ^{to give} a more curved effect rather than the angularity displayed in fragilis & woodwardi.

- | | | |
|-----|---------------------------------|----------------------------|
| 1 - | fragilis and woodwardi resemble | Morphus |
| 2 - | " " | " Geranoetus (") + Buteo |
| 3 - | " " | " " + Buteo |
| 4 - | " " | " " + Buteo |
-
- | | | |
|-----|--------------------|---------------------------------|
| 1 - | gimmelli resembles | Geranoetus (and Aquila) + Buteo |
| 2 - | " " | Aquila |
| 3 - | " " | Aquila (and Morphus) |
| 4 - | " " | is nearest Aquila |

⑤ Position of ~~inner~~ ^{prox} foramen - prox end.
 gimmelli on internal side of internal calcaneal ridge - Aquila
 fragilis distal to int. calcaneal ridge - Geranoetus - Buteo
 woodwardi distal slightly int. & distal to calc. ridge - " 2 of imm.

Tarsus cont'd.

- ⑥ Distal end - trochleae slant upward
with 4 deided shorter.
from 2 to 4 in fragilis & woodwardi.
trochleae nearly on a level - grinnelli
⑥ - fragilis & woodwardi - Geranoaetus - Buteo
⑥ - grinnelli - ? - nearer Aquila.

fragilis.

- ① morphus - occasional Buteo - particularly 2 odd spec.
② Geranoaetus - Buteo
③ Geranoaetus
④ line sharp - Buteo
⑤ distal rather than at all lateral nearer Buteo than Ger.
⑥ Ger. Buteo
7a - Buteo 7b ?

woodwardi

- ① morphus
② Geranoaetus - Buteo
③ Geranoaetus
④ line less sharp - Geranoaetus
⑤ slightly lateral - Geranoaetus
⑥ Geranoaetus - Buteo
⑦ Geranoaetus but shorter & Buteo

grinnelli

- ① Geranoaetus - Buteo (Aquila)
② Aquila
③ Aquila (morphus)
④ Aquila (not identical)
⑤ Aquila
⑥ Aquila (not identical)
7a Aquila? 7b Aquila

- ⑦ Shape and ex cut ? int. cal. ridge
woodwardi - a short - 6 broad at end - comma shaped - Ger -
fragilis - a short 6 end long & overhanging - Buteo but no overhang and Buteo
grinnelli - long - end long - not overhanging

Coracoid

Like spizaetus

Dorsal border of furcular facet not rounded as in Aquila, but "chopped off" - see fig. (b)
Head broad from left to right (fig. - (a))

Like Ag. & spizaetus

Distinct posterior margin present on furcular facet

Humerus

like spizaetus

shaft well curved

Distal end projecting abruptly on ulnar side,

Not identical with any other species available tho close to spizaetus

- ① A heavy bone with ② shaft well curved
- ③ Entepicondylar prominence well inflated
- ④ Deltoid crest pointed ^{at a} distally ^{extends} but ~~is~~ ^{with rounded margin} ~~angular~~ ^{rounded} immediately prox. to tip ^{with distinct}
- ⑤ Bicipital crest ~~is~~ rounded ^{with distinct} distal margin

⑥ Pneumatic foramen broadly rounded
+ heavily bordered

* Possibly variable as of the two specimens of Ger. present - one has rounded distal border, the other angular.

Geranoaethus grinnelli
cf G. melanoleucus
Tarus

Hamus

Tends to be larger (slightly) than G. m. Only one
pneumatic foramen at posterior side prox. end.
Shorter outer porchaure. Notch on head - position
more as in Aquila, depth more nearly approaching G. m.
Distal end ^① inner side with smaller tubercle or "bridge"
from shaft to articular surface, somewhat as in G. m.
the more noticeable. Not like Aquila or Haliaeetus.
② Outer side most like G. m. but certainly not identical.
Projects out further than in Aquila

Tibia: size = to G. m. & larger ^{this not so much}
Fibular ridge diminishes proximally as in G. m.
Crenial crest higher projection proximally than in

G. m. (more like Aquila)

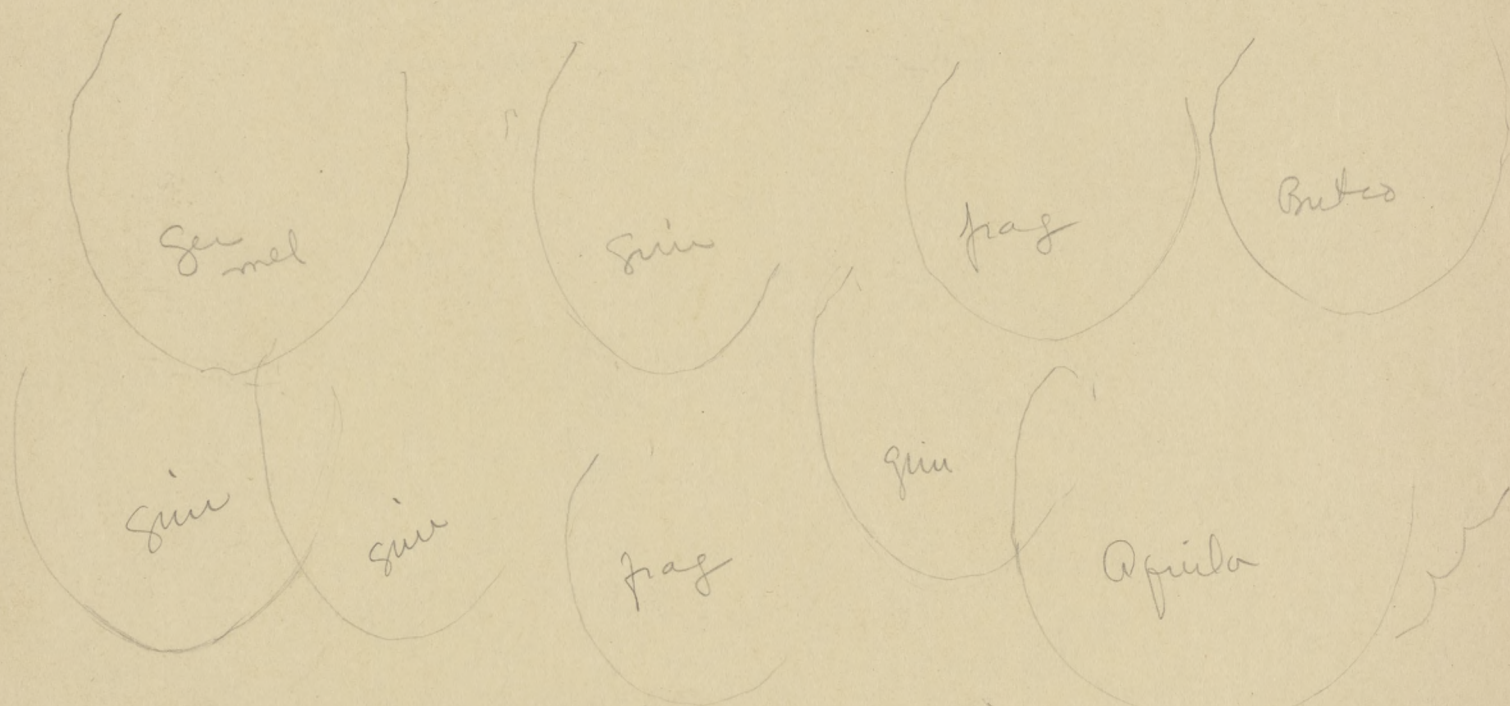
Distal end unlike G. m. having arch between
outer & inner notches at dist. surface as in
Aquila but much further to the right.
More like a modified Aquila than G. m. &

Hamulus:

Very much larger than G. m. Almost as
large as Haliaeetus (large size) and larger than some
Aquila.
Proximal end unlike G. m. &
Distal end shows similar, the muscle scar ^{much} deeper

Clavicles (Furcula)

Material available. — One complete;
four left clavicle with symphysis; five left clavicle;
seven right clavicle; one symphysis (pathological). ^{no.} D 1179



Characters. — Less rounded than Buteo or Aquila, being closer to G. melanoleucus tho ~~the~~ tending to be narrower (more oval). See figures above. Differing from G. melanoleucus in ① curvature at ventral end (not recurved dorsally, but more like Aquila) ② position of furcular process (less prominent at dorsal margin of symphysis — thus like Aquila).

Shape of bone from coracoid facet to tip unlike G. mel. or Buteo or Aquila, tho nearest Aquila in its irregular outline and in narrowness. See ca in table. Clavicles are narrow but heavy nearest Aquila.

Anterior view of symphysis flat and
triangular. Decidedly unlike *Ju.* or *Buteo*
in which the ventral edge is rounded. The
more like *Aquila*, still distinct from *Aquila*
in which latter there is a ^{shelf like} extension of the antero-
ventral border anteriorly ~~see also to part of~~
the anterior surface of the symphysis

Aquila?

guineelli

Libio-tarsus

Distinguished from *Aquila*: 8

Proximal end: 1. Less deeply excavated posteriorly under articular surface; 2. Longer articular surface for fibula; 3. Inner cuneiform crest less prominent; 4. Narrower?

Distal end: 1. Widens more gradually; 2. deeper and more acute intercondylar sulcus; 3. condyles of greater proximal extent posteriorly.

Similar to *Aquila*: 5

Proximal end: 1. Inner cuneiform crest with muscle scars so placed as to divide crest into two parts at anterior edge; 2. Outer cuneiform crest of same general curvature and approx. same extent (may be shorter); 3. Other scars on inner cuneiform crest similar in position.

Distal end: 1. shape and position of supracondylar bridge; 2. Internal lig. prom. slightly posterior in position

9 Distinguished from *geranoaetus melanoleucus*:

Proximal end: 1. ~~inner~~ cuneiform crest not divided in Ger.; 2. muscle scars on crest different in position; 3. less depressed internally; 4. Outer crest shorter and more curved silhouette (ant. view)

Distal end: 1. widening more gradually; 2. intercondylar sulcus deeply grooved (broadly depressed in G.); 3. supracondylar bridge more convex & narrower; 4. int. prox. lig. prom. more distal & posterior; 5. condyles of greater extent posteriorly.

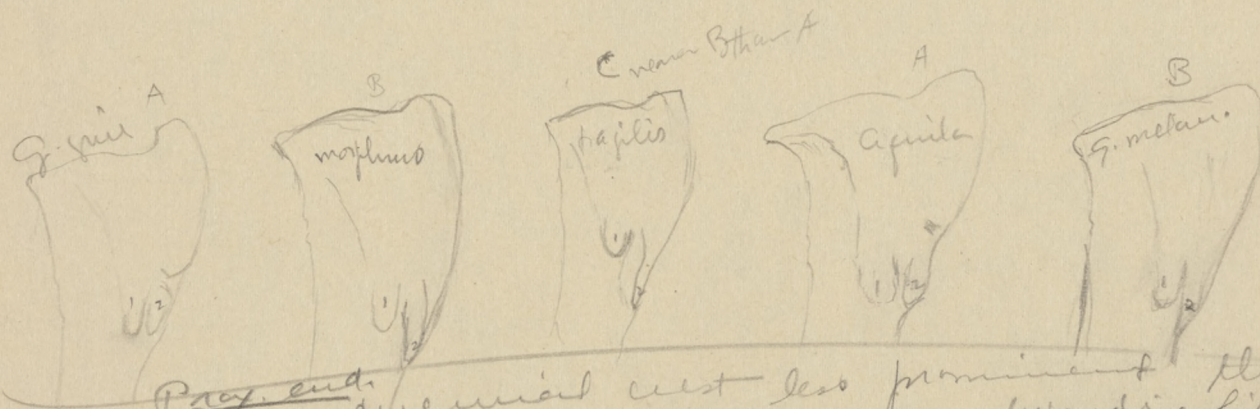
2 Similar to *geranoaetus*:

Prox. end: Moderately prominent inner crest; 1. long articular surface for fibula.

Distal end. Nothing.

J. gunnelli

tribus - tarsus.



Prox. end. Superficial crest less prominent than *Aquila*.
 Similar to *J. mel.*, *frag.*, *Mophus* Woodwardi. Like *fragilis*
 & Woodwardi in excavation of crest. Shaved into two separate
 muscle areas as in *Aquila* but crest is shorter, curved & convex distally
 as in *fragilis*.
 Region distal to prox. end, not excavated as in *Aquila*
 Rostral crest prominent as in no. 679 *Aquila*

Distal end. Nearest *Aquila* of all species in contour
 from post. view, but condylar ridges extending further
 proximally and intercondylar groove deeper & more acute.
 Position of int. lig. from. nearly central tho
 slightly post. as in *Aquila*.
 Supratendinous bridge position and shape as
 in *Aquila* (very convex & irreg. in shape with
 middle-most margin almost practically vertical curved
 distally then turning & straightening to an almost vertical
 position.

1074
 40.6
 17.0
 1147
 100.6
 14.1
 17.0
 14.1
 17.0

49
 50.2
 14.7
 1598
 150.2
 9.6

Small Grinnelli

34 Numerus

one complete and one (3 complete, two prox. end, prox. end.

Material available

and (3 distal end (3))

General appearance - small Grinnelli

Distinguishing characters. - ① Narrower

proximal end with higher and narrower head.

② Preanatic frame narrower and more pointed proximally, ^{3/4} distally ^{1/4} rounded

on internal side of bone by small, but definite ridge

③ ~~mark~~ impression of brachialis anticus appears smaller and less depressed

large Grinnelli

Material available. - Three complete.

General appearance. - Large Grinnelli

1598
 146.2
 13.6

2365
 4705
 9092

2626
 7921
 8708

	x	y	z	x	zy
1	11.9	10.6	8.9	84.8%	88.1%
2	12.1	10.2	8.6	84.2%	84.3%
3	11.8	9.9	8.5	83.8%	85.8%
2365	10.9	10.5	7.3	96.3%	69.5
4705	9.7	10.7	7.8	110.3%	72.8
9092	10.0	9.7	7.3	97.0	75.2
2626	9.4	9.4	6.2	100.5%	65.9
7921	9.6	9.6	6.3	101.5%	65.6
8708	9.0	9.6	6.8	106.6%	70.8

	x	y	z	xy	zy
C5741	9.9	9.1	7.1	91.9%	78.0
C2977	9.6	9.6	6.7	100	69.7
C401	9.0	9.2	7.0	102.2	76.0
E1070	9.5	10.0	7.4	110.5	74.0
C2541	8.7	8.5	6.4	92.7	75.2

Is this a variable character?

Sept

Ba

	3	27.2
	471	27.1
Aquila	727	25.8 - 10.1 - 39.1
	679	23.7 - 9.7 - 40.9
	926	24.2 - 9.8 - 40.5
	5'	23.9 - 10.1 - 42.2

P. mel 233 20.9 - 9.4 44.9

Urea 738 14,3 - 7,5 52,4

Bates 307 15.1 - 6.5 43.0

46Y 14.4 - 7.3 50.7

14.7 - 7.0 47.6

7711

161
185

27.2

23.7

3.5 - a further

238

174

1784

h. 53.3

142.7

5171

1761

178.4

47

21.611

67

mean 20.2

38 | 6

2

13

23

23 22 21 20 19 18 17

33

A 6298 - 19.0
 @ 4450 * 20.2
 A 4370 * 20.4

$$\begin{array}{r} \text{g. } 436.1 \\ \text{r. } 379.8 \\ \hline 57.3 \end{array}$$

$$\begin{array}{r} 379.7 \\ 364.0 \\ \hline 15.7 \end{array}$$

$$\begin{array}{r} 485.1 \\ 522.1 \\ 490.8 \\ 490.9 \\ \hline \end{array}$$

$$\begin{array}{r} 381.5 \\ 396.1 \\ 382.8 \\ 386.0 \\ \hline \end{array}$$

$$\begin{array}{r} 4) 19889 \\ 497.2 \\ \hline \end{array}$$

$$\begin{array}{r} 4) 15464 \\ 386.6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{juv. } 159.8 \\ 142.0 \\ \hline 2) 3018 \\ 150.9 \\ \hline 436.1 \\ 434.2 \\ \hline 1.9 \end{array}$$

$$\begin{array}{r} 84.1 \\ 72.3 \\ \hline 2) 156.4 \\ 78.2 \\ \hline 395.8 \\ 364.0 \\ \hline 31.8 \\ 379.9 \end{array}$$

$$\begin{array}{r} \text{gr } 470.7 \\ \text{g } 436.1 \\ \hline 34.6 \end{array}$$

$$\begin{array}{r} 395.8 \\ 379.7 \\ \hline 16.1 \end{array}$$

$$\begin{array}{r} \text{A wing } 497.2 \\ \text{r } 470.7 \\ \hline 27.5 \end{array}$$

$$\begin{array}{r} \text{legs } 395.8 \\ \text{A } 386.6 \\ \hline 9.2 \end{array}$$

$$\begin{array}{r} \text{Wing } 436.1 \\ \text{g } 379.7 \\ \hline 425.1 \\ \text{r } 379.3 \\ \hline 11.0 \\ \hline .4 \end{array}$$

$$\begin{array}{r} 156.9 \\ 78.2 \\ \hline 175.3 \\ 404.4 \end{array}$$

$$\begin{array}{r} 173.1 \\ 146.4 \\ \hline 26.7 \end{array}$$

$$\begin{array}{r} 97.0 \\ 74.4 \\ \hline 22.6 \end{array}$$

$$\begin{array}{r} 250.6 \\ 177.0 \\ \hline 73.6 \end{array}$$

$$\begin{array}{r} 159.7 \\ 85.7 \\ \hline 188.8 \end{array}$$

$$434.2$$

$$\begin{array}{r} 2) 3195 \\ 159.7 \end{array}$$

$$\begin{array}{r} 2) 1714 \\ 85.7 \end{array}$$

$$\begin{array}{r} 2) 377.6 \\ 188.8 \end{array}$$

$$\begin{array}{r} 153.1 \\ 77.7 \\ \hline 181.0 \end{array}$$

$$\begin{array}{r} 159.8 \\ 146.4 \\ \hline 13.4 \end{array}$$

$$\begin{array}{r} 84.1 \\ 74.4 \\ \hline 9.7 \end{array}$$

$$\begin{array}{r} 185.1 \\ 177.0 \\ \hline 8.1 \end{array}$$

$$\begin{array}{r} 2) 306.2 \\ 153.1 \end{array}$$

$$\begin{array}{r} 2) 158.5 \\ 79.7 \end{array}$$

$$\begin{array}{r} 2) 362.1 \\ 181.0 \end{array}$$

$$413.8$$

Omitting smallest individuals in wing bones;
grinnelli vs. Geranoaetus.

$$\begin{array}{r} \text{Ger } 436.1 \\ \text{grin } 434.2 \\ \hline 1.9 \text{ difference} \end{array}$$

Including smallest individuals in wing bones;
grinnelli vs. Geranoaetus -

$$\begin{array}{r} \text{Ger } 436.1 \\ \text{grin } 425.1 \\ \hline 11.0 \text{ difference} \end{array}$$

Legs of grinnelli compared with Geranoaetus:

$$\begin{array}{r} \text{Geranoaetus } 379.7 \\ \text{grinnelli } 379.3 \\ \hline .4 \end{array}$$

Omitting largest & smallest indivs. in wing bones
grin. vs. Ger.

$$\begin{array}{r} \text{Ger } 436.1 \\ \text{grin } 413.8 \\ \hline 22.3 \text{ difference} \end{array}$$

$$\begin{array}{r}
 115.1 \\
 101.1 \\
 \hline
 152.2 \\
 368.4
 \end{array}
 \qquad
 \begin{array}{r}
 397.8 \\
 136840 \\
 \hline
 35802 \\
 10380 \\
 \hline
 7956 \\
 \hline
 24270
 \end{array}
 \qquad
 \begin{array}{r}
 926
 \end{array}$$

$$\begin{array}{r}
 970 \\
 726 \\
 \hline
 244
 \end{array}
 \qquad
 \begin{array}{r}
 97.0 \\
 74.4 \\
 \hline
 22.6
 \end{array}
 \qquad
 \begin{array}{r}
 891 \\
 726 \\
 \hline
 115
 \end{array}$$

Spizaetus grinnelli

(2 packets) II 2

Sibiae

Sp. ? (see Grinnell's small)

	a	b	c	d	e	f	ba	ca	da	ed	fd	bc
D 1194	132.0	17.3	21.1	17.0	11.5	11.4	13.1	12.6	12.8	67.6	67.1	81.9
E 4067	130.0	17.0	20.4	16.5	11.1	10.7	13.0	12.1	12.6	67.3	64.9	83.3

D 6714

Tarsi

	a	b	c	d	x	e	ba	ca	da	xa	ec
VE 2860	101.3	16.7	—	20.4	8.9	—	16.4	—	20.1	8.7	—
D 6651	104.7	18.1	19.6	22.4	9.3	17.2	18.7	21.3	8.8	38.7	—
VE 9759	104.2	16.9	19.7	20.4	9.1	16.2	18.9	19.5	8.7	37.0	—
J 9857	107.6	17.4	19.8	21.6	9.5	16.1	18.3	20.0	8.8	—	—
E 6655	107.5	17.3	20.0	22.9	9.2	16.0	18.6	21.3	8.5	39.5	—
VB 9989	106.8	16.9	19.7	21.3	8.2	15.8	18.4	19.9	7.6	37.5	—
VE 7147	100.6	16.8	18.4	19.3	—	7.4	—	—	—	—	—
VD 4854	104.8	17.9	18.5	22.6	9.4	17.7	18.5	21.5	8.9	—	—
C 9917	104.8	17.9	18.5	22.6	9.4	17.7	18.5	21.5	8.9	—	—

Tarsi

	a	x	b	h	i	8	ba	ha	ij	ai	aj
C 1362	113.2	24.4	—	17.6	17.4	19.2	21.4	—	15.5	91.5	15.3

Tarsi

	a	b	c	d	e	ba	ca	da	xa
E 3181	107.4	17.9	—	21.1	—	16.6	—	19.6	—
E 3082	106.6	17.8	19.5	21.3	9.0	16.7	18.3	19.9	8.4
C 8455	103.2	17.5	19.6	20.9	9.1	16.9	18.9	20.2	8.8
C 2828	101.2	—	18.7	21.0	—	21.6	18.4	19.9	—
B 9538	114.7	19.7	22.7	24.8	10.0	17.4	19.8	21.6	8.7

1066 | 9000
8508
2134920
183
3.0

1032
17.1
114.8 | 1970
1148
8220
8036
1840

172
133
93
76
1148 | 2300
2296
40

1014 | 8100
7098
10020
1147 | 10000
9174
1147
1032

1148 | 2440
2296
1440
1148
2920

114.8 | 8200
8036
1640

114.8 | 10000
9184
8160
108.7 | 9200
8600
6000

ba - 16.8 - 17.2
ca - 18.3 - 18.9
da - 19.5 - 21.3
ea - 7.6 - 8.9

1068 | 8200
7426
7240

- / / / /

$$\begin{array}{r} 141 \\ 14 \\ \hline 127 \end{array}$$

$$\begin{array}{r} 80 \\ 12 \\ 14 \\ \hline 104 \end{array}$$

170-74

20

6

9

40

7

20

7

170-174

165-70

160-65

155-60

150-55

150-145

140-145

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humulus
griseus

crur. 9
 rostrum 3
 mandible 3
 hum. 12
 femur 18
 cora 50
 scap. 39
 hum. 45
 ulna 33
 rad. 33
 carpus 54
 pelvis 7
 femur 40
 tibia 59
 tarsus 171

 576

G. grisea

July 1 mon. T
 2930 1 2 3 4 5 6 7
 8

77.7
 19.4

 97.1

19.4

 77.7
 4
 37
 29

Humerus Jun.

	b	ba	da	ea	ba	ca
D2626	17.8	—	37.4	—	17.1	— 95.2 — 18.7
B8708	17.4	—	37.9	—	17.8	— 95.2 — 18.5
CY101	17.3	—	38.0	—	17.8	— 90.9 — 19.2
C2548	17.8	—	37.5	—	18.3	— 90.0 — 19.9
C1297	17.5	—	38.5	—	18.0	— 87.7 — 19.8
C5741	17.9	—	38.3	—	18.3	— 92.2 — 19.8
E1070	18.3	—	38.8	—	18.3	— 91.2 — 20.1
D4705	—	—	38.7	—	18.2	— — 20.0
C9092	17.8	—	38.8	—	—	—
D2365	18.0	—	38.7	—	18.7	— 89.4 — 20.0
D4800	17.9	—	39.1	—	19.4	— 87.7 — 20.4
B9326	17.9	—	38.4	—	19.8	— 89.3 — 20.1
D3036	17.9	—	38.3	—	18.8	— 89.2 — 20.1

lilua

quimelli

C 410 200.6

Q 4290 185.1

C 1937 182.4

Q 595 180.9

Q 1250 177.0

C 4998 165.5

611091.5

188.9

200.6
165.5
35.1

185.1 200.6
165.5 177.0
19.6 23.6

177.0
165.5
11.5

180.9
177.0
3.9

200.6
185.1
15.5

173.1 142.0 159.8
97.0 74.4 84.1
200.6 165.5 185.1
470.7 381.9 429.0

200.6 86.2 185.1 86.2
17310 15980
16048 14808
12620 11720
12036 11106
58.40 6140
85.1 88
165.5 14200 165.5 14640
13240 13240
9600
8275
3250 14000

923	178.8	927	192.7	926	182.0	679	180.2
	96.2		104.5		92.8		100.0
	<u>210.1</u>		<u>224.9</u>		<u>211.0</u>		<u>210.7</u>
	485.1		522.1		490.8		490.9

923	98.7	927	101.8	926	99.5	679	201.0
	122.4		129.2		122.9		124.6
	<u>160.2</u>		<u>165.1</u>		<u>160.4</u>		<u>160.4</u>
	381.5		396.1		382.8		386.0

485.1	78.6	522.1	75.8	490.8	77.9
<u>381.50</u>		<u>396.10</u>		<u>382.80</u>	
339.57		365.47		34.356	
41.930		306.30		39.840	
<u>38.808</u>		<u>261.03</u>		<u>34.356</u>	
31.220		452.50		48.840	
78.4					

490.9	146.4	397.8	91.5	72.3	95.8
<u>386.00</u>		<u>36.400</u>		<u>142.0</u>	
37.363		35.802		165.0	
42.370		59.80		379.8	
<u>40.172</u>		39.28		<u>341.82</u>	
219.80		20.020		221.80	
<u>19.636</u>		19.890		18.990	
23.44		42.93		<u>31.900</u>	

159.8	470.7	395.8	429.3	425.1	
84.1	319.8	364.0	319.7	11.0	
<u>185.1</u>	<u>850.3</u>	<u>759.8</u>	<u>49.6</u>		
429.0	426.2	379.9			

173.1	970	200.6	121.3	159.8	114.7	117.2
<u>142.0</u>	72.3	<u>165.5</u>	113.2	<u>150.2</u>	<u>100.6</u>	<u>107.1</u>
2) 315.1	2) 169.3	2) 366.1	2) 234.7	2) 310.0	2) 215.3	379.3
157.5	84.6	183.0	117.2	155.0	107.1	

157.5	381.5	485.1	117.2	425.1	381.5
84.6	396.1	425.1	209.8	60.0	<u>737.8</u>
<u>183.0</u>	382.8		107.1		
425.1	<u>386.0</u>				
	4154.64				
	386.6				

Pinus quinql.
a c

	a	c	d	B	ca	da	h	bar	ha
D 3036	173.1	31.0	34.8	66.5	17.9	20.1	32.6	38.4	18.8
B 9326	172.1	30.9	34.7	66.1	17.9	20.1	34.2	38.4	20.1
D 4800	169.9	30.5	34.8	66.6	17.9	20.4	33.0	39.8	19.4
D 2365	159.8	25.6	32.0	61.4	17.8	20.0	30.0	38.4	18.7
C 9092	159.6	28.5	—	62.0	17.8	—	—	38.8	—
D 4705	157.9	—	31.7	61.2	—	20.0	28.8	38.7	18.2
E 1069	157.2	28.2	31.5	—	17.9	20.0	30.0	—	19.0
E 1070	156.7	28.7	31.5	60.8	18.3	20.1	28.7	38.8	18.3
C 5741	156.2	27.8	30.2	59.9	17.7	19.3	28.6	38.3	18.3
C 297	153.9	26.0	29.9	59.3	—	19.2	27.7	38.5	17.9
C 2548	149.1	26.7	29.7	55.7	17.8	19.9	27.3	37.3	18.3
C 4101	147.0	25.7	28.3	56.6	17.4	19.2	26.4	38.1	17.9
B 8708	146.2	25.7	27.1	55.5	17.5	19.3	26.2	38.6	17.8
D 2626	142.0	25.3	26.6	53.2	17.8	18.7	24.3	37.4	17.1
C 7921		26.8					25.0	16.0	29.6

159.4 - 150.1
159.8 - 153.9

Guinnelli

Carpo-metacarpus

	ae	Length	great depth	least depth	ba	ca	cb	d	da	e
① 1440	9.48	97.0	24.6	21.7	26.3%	23.4	88.6	16.9	17.4	9.2
B 9810	10.0	96.0	24.4	21.4	25.4	22.2	87.7	16.5	17.1	9.6
H 2707	10.0	95.0	24.3	21.5	25.5	22.6	88.4	16.7	17.5	9.5
C 2776	9.4		23.8	20.7	25.1	21.8	87.0	16.2	17.1	
C 7330	10.5	93.6	23.3	20.4	24.8	21.6	89.5	16.0	17.0	9.9
C 7325	9.7	92.0	23.8	20.5	25.8	22.2	86.1	16.3	17.7	9.0
C 679	9.14	90.8	22.8	19.5	25.1	21.4	87.7	15.5	17.0	8.3
H 2622		80.0	21.2	18.9	26.5	23.6	89.1	14.4	18.0	
✓ B 9903	10.8	83.4	21.5	19.0	25.7	22.7	88.3			9.1
✓ B 9809	10.	79.7	21.1	18.6	26.4	23.3	88.1	14.1	17.6	8.0
✓ E 1938	8.81	72.6	19.0	16.5	26.1	22.7	86.8	13.0	17.9	
E 3193		84.0	22.0	19.4	27.1	24.1	88.1	15.4	18.3	
C 399		83.8	21.8	19.1	26.0	22.7	87.6	15.4		
✓ D 4713	10.3	74.5	19.4	17.0	26.0	22.8	87.6	13.9	18.6	7.7
✓ B 9729		81.6	21.7	19.2	24.5	23.5	88.4			
✓ H 2620		78.9	22.0	19.5	27.8	24.7	88.6	14.6	18.6	
✓ C 7980		80.3	21.4	19.1	26.8	23.7	88.4	14.7	18.3	
✓ H 2614		84.0	21.8	19.3	25.9	22.9	88.5	15.5	18.4	9.0
✓ H 2621		81.4	22.2	19.7	27.2	23.5	88.7	14.8	18.1	8.1
✓ H 2618		83.5	21.8	19.2	26.1	23.0				
✓ C 5		81.5	21.2	18.6	26.0	22.8				
D 2281		79.7	21.1	19.0	26.4	23.8		15.8		
B 9396		83.2	20.9	18.5	25.1	22.2	88.5	14.8	17.4	
D 2929	10.0	74.3	20.3	17.6	27.3	23.6	86.7	13.5	18.1	7.5
✓ H 2087	8.77	79.1	20.8	18.7	26.0	23.4	88.5	13.2	17.8	6.5
✓ E 994	8.87	76.6	19.6	17.2	25.5	22.4	87.7	13.7	17.8	6.8
C 134		84.0								9.1
✓ C 5486		81.1								8.0
B 8937		76.4								8.1

27.0
27.91
3.090
78

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
5432	157.9	19.5	23.5	18.8	13.7	13.2	12.3%	14.9%	11.9	78.2	70.3	82.9	96.3													
5204	164.6			20.3																						
7697	152.1	18.9	22.8	18.1	13.4	12.8	12.4	14.9%	11.9	74.0	70.6	82.8	95.5													
213	153.0			18.6																						
4157	157.0	20.2	24.8	19.0	14.0	13.7	12.8	15.7	12.1	73.6	72.1	81.4	97.8													
1108	156.3	19.3	24.6	18.7	13.5	13.0	12.3	15.7																		
2559	158.0	19.1	24.1	18.2	13.3	12.7	12.0	15.2	11.5	73.1																
6077	157.1	19.7	23.9	18.5	13.7	13.4	12.5	15.2	11.7	74.1	67.3	82.4														
3103	156.9	19.5	23.8	18.6	13.0	12.5	12.4	15.1	11.8	69.9																
7044	159.4	20.0	23.8	19.6	13.7	13.2	12.5	15.9	12.2	69.9																
6767	159.8	19.5	23.5	19.8			12.1	14.7	12.3																	
1239	150.1	18.7	23.6	17.7	12.6	12.3	12.4	15.7	11.7	71.2																
2245	157.4	20.0		18.9	13.8	13.5	12.7		12.0	73.1																
6665	156.1	19.3	23.7	18.5	13.7	13.0	12.3	15.1	11.8	74.1																
2797	158.1	19.7	24.5	19.1	13.8	13.3	12.4	15.4	12.0	72.3																
8484	159.8			19.3																						
9730	157.0	20.0	24.4				12.7	15.5																		
7315	156.0	20.0	24.8	19.8	14.0	13.7	12.8	15.9	12.7	76.7																
9033	152.9	20.1	25.0	19.3	13.6	13.5	13.1	16.3	12.6	70.4	69.9	80.4	99.3													
8415	157.9	19.1	23.7	18.5	14.2	13.7	12.1	15.0	11.7	76.7																
1267	155.0		23.8	18.4	13.7</																					

ba 13.1 - 12.0' (11.7 - 11.4)
ca 16.3 - 14.9 (14.8 - 14.3)
da 12.7 - 11.7 (11.0)
ed
fd
cb 11.4 - 10.6 (10.4 - 10.2)

ed
fd
c6

104.6
150.1

14.5

104.6
152.1

12.5

tarano?

$$\text{mean} = 156.3$$
$$\begin{array}{r} 198 \overline{) 1400} \\ \underline{1386} \\ 1400 \\ \underline{1386} \end{array}$$

Genus

2

gimelli

	a	x	h	i	j	x a	h a	i a	j a	i j
Ve 625	112.6	24.1	18.5	18.1	19.7	21.4%	16.4%	16.0%	17.4%	91.8%
Ve 1362	113.2	24.3	17.6	17.3	19.1	21.4	15.5	15.2	16.8	90.5
Ve 8363	115.3a	25.4	19.6	19.0	21.1	22.0	16.9	16.4	18.3	90.0
Ve 9423	116.1a	25.3	19.6	18.9	20.5	21.0	16.8	16.2	17.6	92.1
Ve 2183	117.7	26.3	20.8	19.1	21.1	22.3	17.6	16.2	17.9	90.5
Ve 1811	119.4	26.7	20.9	19.4	22.2	22.3	17.5	16.2	18.5	87.3
Ve 5688	121.3	27.0	21.2	20.2	22.2	22.2	17.4	16.6	18.3	90.9
Ve 5163	120.2	26.9	20.1	19.5	21.0	22.3	16.7	16.2	17.4	92.8
F 4382	116.0	26.8	19.8	18.6	21.0	22.2	17.0	16.0	18.1	88.5
Ve 9270	116.1	25.3	19.7	19.0	21.3	21.8	16.1	16.3	18.3	89.2
Ve 6554	121.3	27.4	20.6	20.6	21.7	22.5	16.9	16.8	17.8	94.9
C 1028	116.8	26.5	19.0	19.6	21.7	22.6	16.2	16.8	18.5	90.3
C 4723	116.7a	25.0	19.5	19.2	20.7	21.4	16.7	16.4	17.7	92.2
Ve 5269	118.2a	27.1	20.5	19.1	21.4	22.8	17.3	16.1	18.1	89.2
C 2685	116.4	25.7a	20.5	18.5	21.2	22.0	17.6	15.8	18.2	87.2
C 313	113.7a	24.4a	19.2	17.4a	19.8	21.0	16.8	15.3	17.4	87.8
C 1241	117.2	26.6	19.2	19.7	21.3	22.4	16.3	16.8	18.0	92.4
D 2355	117.4	26.0	20.1	19.4	21.4	22.1	17.1	16.5	18.2	90.6

$$\frac{121.3}{112.6} = 8.7$$

$$18) 395.9 \overline{) 302.8} \\ \underline{21.9} 12$$

116.9 = mean
 * = mode

$$\begin{array}{r} 35 \\ 18 \\ \hline 199 \end{array} \quad \begin{array}{r} 30 \\ 18 \\ \hline 122 \\ 188 \\ \hline 198 \\ 144 \end{array}$$

$$\begin{array}{r} 153 \\ 1132 \overline{) 1740} \\ \underline{1132} 6080 \\ \underline{6080} 000 \\ \underline{560} 400 \\ \underline{42} \end{array}$$

$$\begin{array}{r} 168 \\ 1132 \overline{) 1910} \\ \underline{1132} 7780 \\ \underline{7780} 000 \\ \underline{980} 000 \\ \underline{9056} \end{array}$$

	Apicula	quint	variation in length (mm.)
Coracoid	15.6	11.5	7.6
humerus	22.3	31.1	16.0
ulna	32.2	35.1	19.0
carpus	20.3	24.4	11.9
scapula	21.8	14.5 8.7	12.1
Radius	16.9	14.2	17.1
Tibia	24.8	14.5	18.7
wing	94.8	90.6	46.9
leg	31.5	37.4	47.9

$11.0 - 90.6 = 20.2\%$
 $15.6 - 94.8 = 16.4\%$

$$\begin{array}{r}
 2012 \\
 1822 \\
 \hline
 190
 \end{array}$$

$$\begin{array}{r}
 244.1 \\
 210.1 \\
 \hline
 37.0
 \end{array}$$

$$\begin{array}{r}
 23.7 \\
 1.63 \\
 \hline
 19.1
 \end{array}$$

Eagle Numerus

June 1927 Lam

#	a	b = $\frac{a \times 10}{d}$	c	d	e	R = $\frac{a-d}{10}$	ca	da
D3036	173.1	65.9	31.8	34.6a	17.2	32.8	18.9	19
E4800	169.9	67.8	30.5	35.0	18.2	33.3	17	20
D2366	159.8	61.5	28.6	32.0	16.2	30.1	17	20
E9092	159.6	62.3	28.5	—	15.5	—	—	—
D4706	158.2	60.8	—	31.4	—	29.1	—	19
E1096	157.5	—	28.2	31.5	15.8	30.0	17	20
E1070	156.7	60.5	28.7	31.2a	15.2	28.9	18	19
E5741	156.7	59.5	27.8	30.0	14.7a	28.7a	17	19
E297	153.9	57.2	—	—	14.2a	27.6	—	—
B8708	146.2	55.5	25.6	27.3a	13.8	26.0	17	18
D2626	142.1	52.0	25.2	26.3	13.7	24.2	17	18
E4596	—	—	28.4	—	15.9	—	—	—
E2778	—	—	25.8	—	14.2	—	—	—
B8587	—	—	27.2	—	15.1	—	—	—
E4353	—	—	25.7	—	13.9	—	—	—
E4011	—	—	28.2	—	15.1	—	—	—
E4183	—	—	25.7	—	13.9	—	—	—
E2866	—	—	28.8	—	15.5	—	—	—
E2954	—	—	25.8	—	13.8	—	—	—
D9376	—	—	26.6	—	14.6	—	—	—
D7866	—	—	27.1	—	15.0	—	—	—
E1817	—	—	27.4	—	15.4	—	—	—
E2634	—	60.8	—	31.4	—	29.7	—	—
E7921	—	50.6	—	26.6	—	25.1	—	—
B8607	—	66.5	—	33.9	—	31.9	—	—
E4101	—	55.5	—	28.1	—	26.7	—	—
E1999	—	53.8	—	27.3	—	26.3	—	—
E9944	—	60.5	—	31.0	—	29.6	—	—
E1457	—	60.9	—	30.7	—	30.5	—	—
E5092	—	56.1	—	28.6	—	28.0	—	—
E1734	—	58.2	—	30.0	—	27.8	—	—
E6544	—	62.2	—	32.0	—	31.0	—	—
D7031	—	60.9	—	30.6	—	28.9	—	—
E1706	—	—	—	27.2	—	25.7	—	—
E5856	—	59.3	—	31.3	—	29.3	—	—
E2548	—	55.7	—	29.7	—	27.4a	—	—
E7087	—	—	—	30.6	—	28.4	—	—
D3026	—	60.9	—	30.6	—	29.5	—	—
E1463	—	57.8a	—	30.3	—	29.4	—	—

J. J. Gurnelli
Howard 1928

62	61	60	59	58	57	56	55	54	53	52	51	50	49
63.3													
62.7	61.3	60.2	59.6	58.9	57.8	56.7	55.7	54.4		52.3			
62.6	61.0	60.3	59.9a	58.6		56.7	55.1	54.9					
62.5	61.6	60.4	59.1	117.3		113.4	55.7	109.3					
62.1	61.2	60.2	59.2				55.1						
62.2	61.3	60.4a	59.4	12			211.6						
62.8	61.4	60.4	247.2										
438.2	61.9	60.7											
	61.0	60.4											
	61.8	60.5											
	61.5	60.7											
	61.6	60.5											
	67.5.6	60.7											
		60.2											
		60.2											
		60.4											
		90.6.4											

*Spizactus
gunnelli*

50
~~49~~ - 10

Coracoid

103	172	171	170	13 spaces	159	158	157	156	155	154	153	152	151
173.1	172.3		170.0		159.8	158.0	157.4	156.5		154.0	149.1	147.0	146.7
					159.6			156.7					
170.5	165.5	160.5	155.5	150.5	145.5	140.5							
173.1			159.8	154	149.1	142.0							
172.3			159.6		147.0								
170.0			158.0		146.4								
			157.4										
			156.5										
			156.7										
3	0	0	6	1+	3	1							

humans

173
142
31

3-14

14

5

$$\begin{array}{r}
 1731 \overline{) 11486} \\
 \underline{10386} \\
 10940 \\
 \underline{10386} \\
 5540
 \end{array}$$

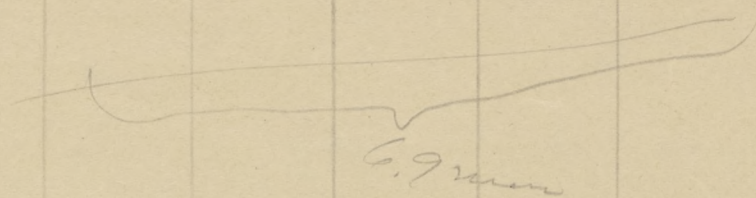
$$\begin{array}{r}
 1420 \overline{) 11060} \\
 \underline{9940} \\
 12000
 \end{array}$$

$$\begin{array}{r}
 164 \overline{) 1630} \\
 \underline{1476} \\
 1540 \\
 \underline{1476} \\
 640
 \end{array}$$

$$\begin{array}{r}
 1731 \overline{) 16460} \\
 \underline{15579} \\
 8810 \\
 \underline{8665} \\
 1476 \\
 \underline{1540} \\
 1476 \\
 \underline{640} \\
 492 \\
 \underline{148}
 \end{array}$$

$$\begin{array}{r}
 8810 \\
 \underline{8665} \\
 1550
 \end{array}$$

97	96	95	94	93	92	91	90	89	88	87	86	85	84
97.0	96.0	95.0	94.6	93.6		91.8	90.9						84.0 84.1



Carpus p. 11 su next page → → corda

7

X

2

Spizaeus
gunnelli

Thomson
Gunnell

a

D 3034 173.1
C 4800 170.0
B 9326 172.3
D 2365 159.8
E 1070 156.7
C 9092 159.6
D 4705 158.0
E 1069 157.4
C 5741 156.5
C 297 154.0
B 8708 146.4
D 2626 142.0
C 4101 142.0
D 9376 149.1

173.1
142.0
31.1

114	113	112	111	110	109	108	107	106	105	104	103	102	101	100
114.6	113.8	112.3	111.7	110.1	109.1	108.7	107.7	106.8	105.8	104.2	103.9	102.1	101.1	100.6
114.7	113.7	112.4	111.1	110.9	109.5	108.8	107.6	106.8	105.8	104.6	103.0	102.2	101.1	
229.3	113.1	112.8	111.7	110.0	109.1	108.8	107.2	106.7	105.4	104.3		102.8	101.4	
	340.6	122.2	111.3	110.5	109.1	108.7	107.5	106.8	105.6	104.4	206.9	102.8	101.2	
		449.7	111.0	110.7	109.4	108.3	107.5	106.7	105.0	104.0		409.9	404.8	
			111.7	110.6	109.4	108.8	107.8	106.8	105.8	104.8				
			648.5	663.0	109.7	108.8	107.7	106.5	633.4	626.3				
					109.5	108.5	107.6	106.6						
					109.5	108.2	107.4	106.4						
					109.7	108.4	107.0	106.4						
					109.7	1194.8	107.7	106.4						
					109.1		107.8	106.3						
					109.0	70	107.8	106.0						
					109.8	49	109.6	1421.8						
					1531.1	119	107.1							
						124	107.3							
							182.78	12						
					14	11	③	②						

48 SP, 2 aelis
Gimella

Taurus

101-14

121	120	119	118	117	116	115	114	113						
121.3	120.5a	119.3	118.3	117.4	116.9a	115.5a		113.2						
121.3		119.3		117.7	116.9	115.7a		113.7a						
2426		2386		117.5	116.3	115.1		226.9						
				342.4	116.1a									
					116.1	346.3								
					116.2a									
					698.5	3								

Taurus

20 - 2

Spizaelus
ornatus
D.R. Dickey no.
16782 16729

Coracoid 48.6
Humerus 116.0
ulna
carpus
femur 91.8 93.6
tibia 127.0 132.0
tarsus 92.0 96.8
min
leg 310.8 322.4

humerus }
ulna }

femur } 79.1%
humerus }

cor }
wing }

cor }
leg } 15.0%

leg }
wing }

Plate XVIII, fig. 1 and 2
femur
tibia
Plate XIX, figs. 1-16

174
1110 1740
1110 1110
8360
47970
5300
1110 19400
8880
5200

16872

92

127

91.8

310.8

16929

96.8

132.0

93.6

32.24 | 48.60

3224

16360

16120

240

cor. to leg. 15.0%
16929

sum 5 figures

16872

79.1%

79.1

116.0 | 918.0

8120

10600

10440

140

Spizaeus

Tarsus

Cap. Lich	a	b	c	d	e	ba	ca	da	g	e	f	ed
									22	24.3	24.4	
16872	92.0	17.9	19.8	21.3	10.0	19.42	21.5	23.1	11.3	7.8	10.2	36.1%
16829	96.8	18.1	20.0	21.9	9.5	18.72	20.6	22.6	11.5	7.4	10.1	33.7%

Tibia

	a	b	c	d	e	b	ca	da
16872	127.0		20.4	17.0	11.6	11.8	16.0	13.4
16829	132.0		20.6	16.9	11.4	11.6	15.5	12.8

105' @ - tarsus gen 18471

366 - gen. 18471 ed tarsus

$$\begin{array}{r} 199 \overline{) 730} \\ 397 \\ \hline 1330 \\ 1394 \\ \hline 11360 \end{array}$$

$$\begin{array}{r} 105.0 \overline{) 19990} \\ 1050 \\ \hline 9400 \\ 8400 \\ \hline 10000 \\ 15 \end{array}$$

$$\begin{array}{r} 1132 \overline{) 11730} \\ 1132 \\ \hline 4980 \\ 5660 \\ \hline 3200 \end{array}$$

This ^{small fact} ^{to proceed} ^{breadth} ^{max} ^{breadth} ^{function fact} ^{min}

Coracoid